Geophysical Research Abstracts
Vol. 14, EGU2012-9544, 2012
EGU General Assembly 2012

Vesta and the HED meteorites: comparison of spectral properties

E. Ammannito (1), M.C. De Sanctis (1), S. Fonte (1), G. Magni (1), F. Capaccioni (1), F. Tosi (1), M.T. Capria (1), D. Blewett (2), J.P. Combe (3), M. Farina (1), T. B. McCoord (3), D.W. Mittlefehldt (4), E. Palomba (1), H. McSween (5), C. Pieters (6), J. Sunshine (7), T.N. Titus (8), M Toplis (9), C.T. Russell (10), and C.A. Raymond (11)

(1) Istituto di Astrofisica e Planetologia Spaziali INAF, Roma, Italy (eleonora.ammannito@ifsi-roma.inaf.it), (2) Johns Hopkins University APL, USA, (3) Bear Fight Institute, Wintropp, USA, (4) NASA/Johnson Space Center, Huston, USA, (5) University of Tennessee, Knoxville, USA, (6) Brown University, Providence, USA, (7) University of Maryland College Park, Greenbelt, USA, (8) USGS Astrogeology Science Center, Flagstaff, USA, (9) Observatoire du Midì-Pyrenees, France, (10) UCLA, Los Angels, USA, (11) JPL, Pasadena, USA

We present the main results obtained comparing the visible-near infrared (VIS-NIR) spectra Vesta's surface with howardites, eucrites, diogenites (HEDs). HEDs are commonly associated with Vesta based on spectral similarities. Because of such association, much effort is being made to merge the information from HEDs – as well as Vestoids – with that from Vesta to characterize the lithologic diversity of the surface of this asteroid and to infer clues regarding its thermal history. The Dawn spacecraft, orbiting around Vesta since July 2011, is performing detailed observations of this body and thus improving our knowledge of its properties. Dawn's scientific payload includes an imaging spectrometer, VIR-MS, sensitive to the VIS-NIR spectral range. VIR-MS began acquiring spectra during the approach phase that started in May 2011 and will continue its observations through July 2012 when the spacecraft will depart Vesta to travel to Ceres. The observations are uniformly distributed in latitude and longitude, allowing a global view of Vesta's crustal spectral properties. Using the information provided by VIR spectra, we studied the distribution of the spectral heterogeneities on the surface and used our findings to perform a comparison with HED spectra in the VIS-NIR spectral range searching for analogies and/or incompatibilities. In our analysis, we utilized a method to compare the results obtained at microscopic scale on HED samples and the one obtained at macroscopic scale on the surface of Vesta. The intent of this study is to improve our understanding of the connection between Vesta and the HEDs, which is one of the primary Dawn scientific objectives.
Dawn VIR spectra are characterized by pyroxene absorptions and most of the surface materials exhibit howardite-like spectra. However, some large areas can be interpreted to be material richer in diogenite (based on pyroxenes band depths and band centers) and some others like eucrite-rich howardite terrains. In particular, VIR data strongly indicate in the south polar region (Rheasilvia) the presence of Mg-pyroxene-rich terrains. The hypothesis that Vesta is the HED parent body is consistent with, and strengthened by, the geologic and spectral context for pyroxene distribution provided by VIR on Dawn.

The authors gratefully acknowledge the support of the Dawn Instrument, Operations, and Science Teams.This work is supported by an Italian Space Agency (ASI) grant and by NASA through the Dawn project and a Dawn at Vesta Participating Scientist grant.